

Zoopraxography

OR THE

Science of Animal Locomotion

BY

EADWEARD MUYBRIDGE

University of Pennsylvania

1893

THE SCIENCE OF ZOOPRAXOGRAPHY.

MADE POPULAR BY SUGGESTIVE
TRACINGS FROM
"ANIMAL LOCOMOTION."

A series of FIFTY ENGRAVINGS, each of which illustrates from 12 to 15 consecutive phases of some complete movement, photographed from life.

The successive phases of each action are arranged in a circle NINE INCHES IN DIAMETER; for reduced copies of some of which see appendix A.

Printed on six-ply Bristol-board and enclosed in

A STRONG CLOTH PORTFOLIO,
size 10x12 inches; price Five Dollars in the United States; or one Guinea in Great Britain.

Sent upon receipt of price, free of postage, to any country within the Universal Postal Union.

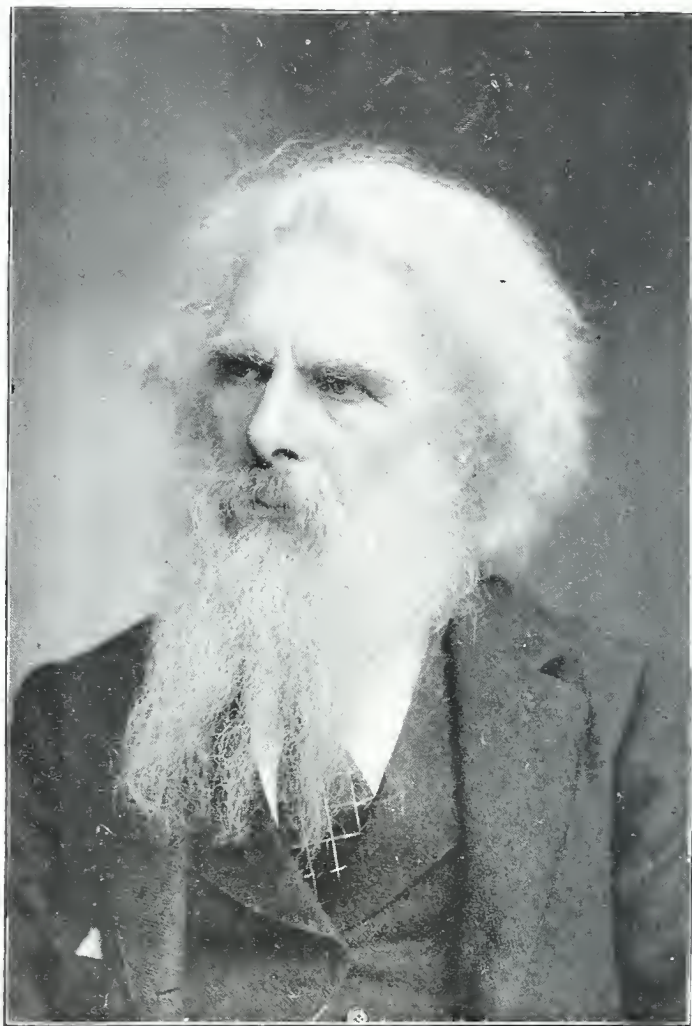
EADWEARD MUYBRIDGE,
University of Pennsylvania,
PHILADELPHIA, U. S. A.

Or, at 10 Henrietta Street,
Covent Garden, LONDON.



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Faithfully Yours
Edward
Thompson

DESCRIPTIVE
ZOOPRAXOGRAPHY

OR THE SCIENCE OF ANIMAL LOCOMOTION
MADE POPULAR

BY

EADWEARD MUYBRIDGE

WITH SELECTED OUTLINE TRACINGS REDUCED FROM SOME OF
THE ILLUSTRATIONS OF

“ANIMAL LOCOMOTION”

AN ELECTRO-PHOTOGRAPHIC INVESTIGATION OF CONSECUTIVE
PHASES OF ANIMAL MOVEMENTS, COMMENCED 1872,
COMPLETED 1885, AND PUBLISHED 1887,
UNDER THE AUSPICES
OF THE

UNIVERSITY OF PENNSYLVANIA

PUBLISHED AS A MEMENTO OF A SERIES OF LECTURES GIVEN BY THE AUTHOR
UNDER THE AUSPICES OF THE UNITED STATES
GOVERNMENT

BUREAU OF EDUCATION

AT THE

WORLD'S COLUMBIAN EXPOSITION, IN ZOOPRAXOGRAPHICAL HALL

1893

University of Pennsylvania
1893

COPYRIGHTED, 1893,
BY
EADWEARD MUYBRIDGE

The Lakeside Press
R. R. DONNELLEY & SONS CO., CHICAGO

DESCRIPTIVE ZOOPRAXOGRAPHY.

An Elementary Treatise on Animal Locomotion.

BY

EADWEARD MUYBRIDGE.

Illustrated with twelve consecutive phases—occurring during a single stride—of each of the six regular progressive movements of the horse, traced from the results of an investigation made by the Author for the University of Pennsylvania.

12 mo. bound in cloth. Price in the United States, One Dollar; in Great Britain Four Shillings and Three Pence.

Sent upon receipt of price, free of postage to any country within the Universal Postal Union.

EADWEARD MUYBRIDGE,

University of Pennsylvania,

Philadelphia, U. S. A.

Or 10 Henrietta Street,

Covent Garden, London.

THE SCIENCE OF ZOOPRAXOGRAPHY.

Made Popular by Suggestive Tracings from "Animal Locomotion."

A series of FIFTY ENGRAVINGS, each of which illustrates from 12 to 15 consecutive phases of some complete movement, photographed from life.

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EADWEARD MUYBRIDGE,

University of Pennsylvania,

Philadelphia, U. S. A.

Or, at 10 Henrietta Street,

Covent Garden, London.

To convert the circles of figures into a

ZOOPRAXISCOPE.

cut out the disc, and, radiating from the centre thereof, about midway from the margin, cut or stamp thirteen equidistant perforations; each an inch long, and about the sixteenth of an inch wide.

Pin the centre of the disc to a handle and revolve it in the direction of the arrow, at a distance of about twenty-four inches, in front of a mirror.

By looking through the *upper* series of perforations at the reflection of the *lower* series of figures, a semblance of the original movements of life will be seen.

The figures may be appropriately colored, and the back of the cardboard disc should be painted a dark color, or covered with a piece of dark surfaced paper before cutting the perforations.



PREFACE.

In the summer of 1892 while the Author was in California, preparing for a Lecturing tour through Australia and India, he received an invitation from the Fine Arts Commission of the World's Columbian Exposition to give a series of Lectures on ZOOPRAXOGRAPHY in association with the Exposition now being held in Chicago.

As these Lectures under the more familiar title of "The Science of Animal Locomotion in Its Relation to Design in Art" had already been given at nearly all the principal Institutions of Art, Science and Education in Europe and in the United States, (see appendix A) the Author was induced to believe that they might be repeated in a popular manner at the Exposition, with

some appreciation of the importance of the facts which his investigation has revealed, not merely by the student of Nature or of Art, but by that large and important class of students, known as the general public.

Under this impression he delayed his far Occidental expedition and returned to Chicago to find a commodious theater erected for this special purpose on the grounds of the Exposition, to which the name of Zoöpraxographical Hall had been given; the Science of Zoöpraxography having had its origin in the Author's first experiments in 1872. It is not intended in this monograph to give more than a synopsis of the usual course of Lectures on the subject, nor to reproduce any of the pictured or sculptured representations which are necessary for its proper elucidation, but merely to describe the common methods of limb action adopted by quadrupeds—especially by the horse—in their various acts of progressive motion, and to illustrate the most important phases of these movements by tracings from the original photogravures of the Author's work.

In the presentation of a Lecture on Zoöpraxography the course usually adopted is to project, much larger than the size of life upon a screen, a series of the most important phases of some act of animal motion—the stride of a horse, while galloping for example—which are analytically described. These successive phases are then combined in the Zoöpraxiscope, which is set in motion, and a reproduction of the original movements of life is distinctly visible to the audience.

With this apparatus, horse-races are reproduced

with such fidelity that the individual characteristics of the motion of every animal can readily be seen; flocks of birds fly across the screen with every movement of their wings clearly perceptible; two gladiators contend for victory with an energy which would cause the arena to resound with wild applause, athletes turn somersaults, and other actions by men, women and children, horses, dogs, cats and wild animals, such as running, dancing, jumping, trotting and kicking, are illustrated in the same manner. By this method of analysis and synthesis the eye is taught how to observe and to distinguish the differences between a true and a false impression of animal movements. The Zoöpraxiscopical exhibition is followed by illuminated copies of paintings and sculptures, demonstrating how the movement has been interpreted by the Artists of all ages; from the primitive engravers of the cave dwelling period, to the most eminent painters and sculptors of the present day.

INTRODUCTION.

IN the year 1872, while the Author was engaged in his official duties as Photographer of the United States Government for the Pacific coast, there arose in the city of San Francisco one of those controversies upon Animal Locomotion, which has engaged the attention of mankind from the dawn of symbolical design, to the present era of reformation in the artistic expression of animal movements.

The subject of this particular dispute was the possibility of a horse having all of his feet free of contact with the ground at the same instant, while trotting, even at a high rate of speed, and the disputants were Mr. Frederick MacCrellish and the Hon. Leland Stanford.

The attention of the Author was directed to this controversy and he immediately sought the means for its settlement.

At this time the rapid dry plate had not yet been evolved from the laboratory of the chemist, and the problem before him was to develop a sufficiently intense and contrasted image upon a wet collodion plate, after an exposure of so brief a duration that a horse's foot moving with a velocity of more than a hundred lineal feet in a second of time, should be photographed practically "sharp."

A few days' experimenting and about a dozen negatives, with a celebrated fast trotter—"Occident"—as a model, while trotting at the rate of a mile in two

APPENDIX A.

SYLLABUS OF A COURSE OF TWO LECTURES

ON

ZOOPRAXOGRAPHY

OR

THE SCIENCE OF ANIMAL LOCOMOTION IN ITS RELATION TO DESIGN IN ART.

Origin of the Author's Investigations—Diagram of the Studio at the University of Pennsylvania where the Investigation was conducted—Batteries of Cameras, Electro-exposers, Contact-motor, Chronograph, and other apparatus used for photographing consecutive phases of animal movements—Method of obtaining successive exposures of moving objects synchronously from several different points of view—Normal Locomotion of Animals—Twelve consecutive phases of a single step of the Horse while walking; also of the Ox, Elk, Goat, Buffalo, and other cloven-footed animals; the Lion, Elephant, Camel, Dog, and other soft-footed animals; of the Sloth while suspended by its claws, and of the Child while crawling on the ground; of man walking erect—The Normal Method of Locomotion by all animals essentially the same—The Quadrupedal Walk as interpreted by Pre-historic Man, by the Egyptians, Assyrians, Phœnicians, Etruscans, Greeks, Romans, Byzantines, and by eminent artists of mediæval and of modern times—The Statue of Marcus Aurelius the great source of modern errors; Marcus Aurelius in London, Ediuburgh, Glasgow, Dublin, Paris, Berlin, Amsterdam, New York, Boston, and many

other cities—Albert Durer, Verroechio, Meissonier, Paul Delaroche, Landseer, Rosa Bonheur, Elizabeth Thompson Butler, &c.—Other Quadrupedal movements, the Amble, Rack, Trot and Canter—Twelve phases in the Gallop of a Horse—Origin of the modern representation of the Gallop—Gallop as depicted by the Hittites, North American Indians, Egyptians, Assyrians, Greeks, the mediæval artists—The modern conventional gallop; evidences of its absurdity; acknowledgment by the Artist of the necessity of reformation—Leap of the Horse, Kick of the Mule, &c., all illustrated by photographs the size of life, from nature, and comparisons made with the interpretation of the same movements by artists of pre-historic, ancient, mediæval and modern times—Demonstration of the action of the primary feathers in the wing of a Bird while Flying, and a solution of the complex problem of Soaring.

AFTER THE VARIOUS METHODS OF LOCOMOTION HAVE BEEN DEMONSTRATED BY ANALYSIS, THEY WILL BE REPRESENTED SYNTHETICALLY BY THE ZOOPRAXISCOPE.

Among the many Institutions where Mr. Muybridge has had the honor of Lecturing on

ZOOPRAXOGRAPHY

are the following:—

Royal Academy of Arts, London.
 Royal Society of London.
 Royal College of Surgeons, London.
 Royal Institution of Great Britain.
 Royal Dublin Society.
 Royal Geographical Society.
 Royal Institution, Hull.
 British Association for the Advancement of Science.
 Linnean Society, Zoological Society.
 Art and Science Schools, South Kensington Museum.
 London Institution, Glasgow Philosophical Society.
 Newcastle Literary and Philosophical Society.
 Birmingham Natural History and Microscopical Society.
 Town Hall, Birmingham; Nottingham Arts Society.
 Manchester Athenæum.
 University of Oxford.
 Eton College, Clifton College.
 Wellington College, Yorkshire College,
 Rugby School, Charterhouse.
 Leeds Mechanics' Institute.
 Sheffield Literary and Philosophical Society.
 Belfast Natural History and Philosophical Society.
 Warrington Literary and Philosophical Society.
 Yorkshire Philosophical Society, Bristol Naturalists' Society.
 Bath Associated Scientific and Art Societies.
 Ipswich Scientific Society, Photographie Society of Ireland.
 Liverpool Associated Literary, Scientific and Art Societies.
 St. George's Hall, Liverpool.
 School of Military Engineering, Chatham.
 The School of Fine Arts; Hall of the Hemicycle, Paris.
 The Society of Artists, Berlin.
 The Society of Artists, Vienna.
 The Society of Artists, Munich.
 The Urania Scientific Society, Berlin.
 The Polytechnic High School, Vienna.
 The Polytechnic High School, Munich.
 The University of Turin.
 The "Cerele de L'Union Artistique,"
 The Studio of M. Meissonier in Paris, Etc., Etc., Etc.

And at all the principal Institutions of Art, Science, Education and Learning in the United States of America.



1. ATHLETE, HORSE-BACK SOMERSAULT.

ABBREVIATED CRITICISMS.

“On Monday last, in the theatre of the ROYAL INSTITUTION, a select and representative audience assembled to witness a series of the most interesting demonstrations of Animal Locomotion given by Mr. Muybridge.

“The Prince and Princess of Wales, Princess Victoria, Louise, and Maud, and the Duke of Edinburgh honored the occasion by their presence; likewise did I note among the brilliant company Earl Stanhope, Sir Frederick Leighton, P.R.A.; Professors Huxley, Gladstone, and

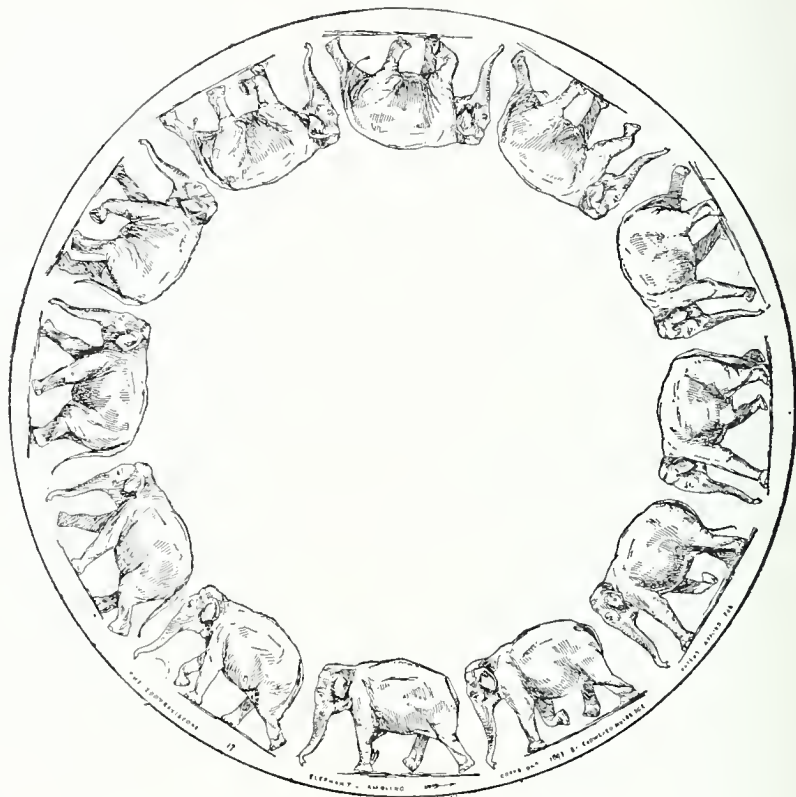


6. ATHLETE, STANDING LONG JUMP.

"These demonstrations are marvellously complete, . . . exceedingly abundant and rich in suggestion and instruction, and appeal to almost every class or condition of humanity."—*Saturday Review, London*.

"Mr. Muybridge delighted his audience with his wonderful photographs."—*The Times, London*.

" . . . Last night Mr. Muybridge gave his final lecture in Newcastle on 'The Science of Animal Locomotion,' with the whole of the wonderful illustrations; the Art Gallery being again crowded to excess."—*Newcastle Chronicle*.



17. ELEPHANT AMBLING.

“A demonstration that vividly interests all the world.”
—*L'Illustration, Paris.*

“Many of these pictures have great—indeed, astonishing—beauty. The interest which they present from the scientific point of view is three-fold:—(a) They are important as examples of a very nearly perfect method of investigation by photographic and electrical appliances. (b) They have also a great value on account of the actual facts of natural history and physiology which they record. (c) They have, thirdly, a quite distinct, and perhaps their most definite, interest in their relation to psychology.”—
PROF. E. RAY LANKESTER, F. R. S., in *Nature*.

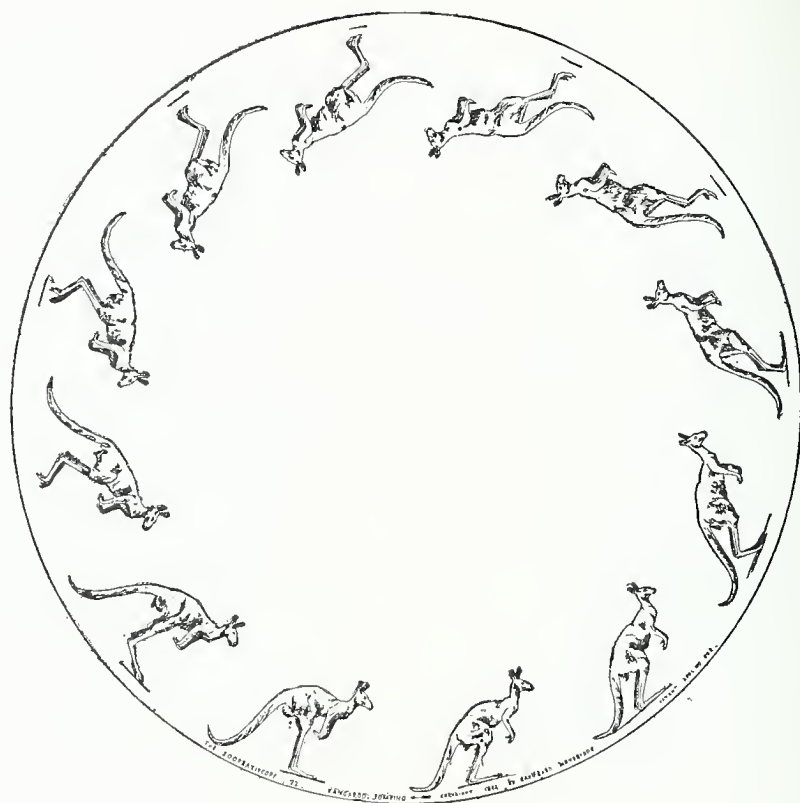


20. EGYPTIAN CAMEL RACING.

“The sensation of the day, and the topic of popular conversation.”—*Boston Daily Advertiser*.

“The rapid movements by different animals were most interesting: and hurdle-racing by horses—the very whipping process being visible—brought down the house.”—*Boston Herald*.

“On revolving the instrument, the figures that have been derided by so many as impossible absurdities, started into life, and such a perfect representation of a racehorse at full speed as was never before witnessed was immediately visible.”—*The Field, London*.



22. KANGAROO JUMPING.

"The lecture theatre of the ROYAL ACADEMY OF ARTS was filled to overflowing."—*Athenæum, London*.

"The Royal Dublin Society's Theatre was filled to its utmost capacity yesterday afternoon, when Mr. Muybridge resumed his course of Lectures. The demonstration is simply marvellous."—*Daily Express, Dublin*.

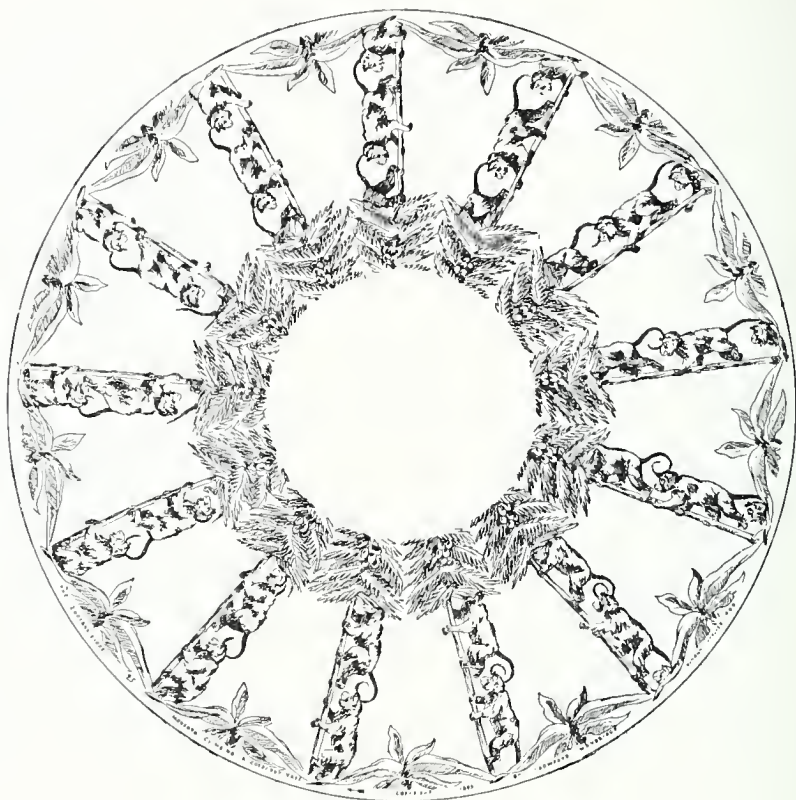
"The result of years of labor, and of large expenditure of money is at last laid before the public in this magnificent work, and the result is one of which Mr. Muybridge and the University of Pennsylvania may well be proud."—*Evening Post, New York*.



24. ELK GALLOPING.

“Mr. Muybridge illustrated his lecture with a series of most valuable photographs, as well as that most fascinating of scientific toys—the ZOOPRAXISCOPE.”—*Magazine of Art, London*.

“His labors attracted considerable attention in the world of science, while among artists and art critics a pretty controversy set in on the subject of the horse and his representation in art, which is likely to be revived and extended to other fields. . . . With Mr. Muybridge, ‘Instantaneous Photography’ has acquired a new significance, . . .”—*Saturday Review, London*.



25. MONKEYS CLIMBING A COCOA PALM.

“No parallel in the history of photography.”—*Photographic Times, New York.*

“An exhibition which Raphael, Tintoretto, Michael Angelo, and other great masters of the Renaissance would have travelled all over Europe to see.”—*Evening Transcript, Boston.*

“The audience was astonished and delighted at the marvellous demonstrations of Animal Locomotion that were brought before them. . . . The most remarkable feature of the British Association meeting this year.”—*Newcastle Journal.*



32. PIGEONS FLYING.

“The art critic and the connoisseur will find a study of Mr. Muybridge’s work of inestimable value in aiding them to criticize intelligently.”—*Pennsylvanian, Philadelphia*.

“The applause which greeted these wonderful pictures from the brilliant company was hearty in the extreme; and all predicted a new era was open to art, and new resources made available for the use of artists.”—*Galigani’s Messenger, Paris*.

“Of immense interest and value.”—*Lippincott’s Magazine, Philadelphia*.



34. GRECIAN DANCING GIRLS

“The ZOOPRAXISCOPE is the latest, most unique, and instructive form of amusement possible.”—*Commercial Gazette*, Cincinnati.

“His work at once attracted the attention of the world.”—*Scientific American*, New York.

“Of much interest and value, as well as a source of great amusement.”—*Observer*, London.

“The realism of the motions of the various animals was intense, and the audience was very enthusiastic.”—*Boston Post*,



41. HORSE CANTERING.

“A host of well-known scientists and artists are greatly interested in this remarkable work.”—*Pull Mull Gazette*.

“The lecture on Tuesday night more than fulfilled the expectations which the audience had formed of Mr. Muybridge’s researches.”—*Belfast News Letter*.

“Mr. Muybridge might well be proud of the reception accorded him by his distinguished audience; it would have been difficult to add to the *éclat* of his appearance, and his lecture was welcomed by a warmth as hearty as it was spontaneous.”—*The Photographic News, London*.



42. HORSE GALLOPING

“The illustrations are truly wonderful, and the rapid changing positions were most instructive.”—*Nottingham Express*.

“The concert room was crowded. . . . A vote of thanks to the Lecturer was proposed by his Grace the Archbishop.”—*Yorkshire Chronicle*.

“A very brilliant audience was assembled at the Royal Institution. . . . The photographs properly studied should be most valuable in affording truer and more exact data for the painter to base his work upon. . . .”—*The Builder, London*.



46. COLUMBIAN EXPOSITION HORSE RACE, TROTting.

“Wonderful and interesting demonstration; its influence will become more and more potent and universal as the years go on.”—*Argus, Albany*.

“Will necessarily revolutionize the treatment of the action of the horse in painting and sculpture. For the physiological study of animal movements these pictures are a veritable treasure.”—*Landwirthschaftliche-Zeitung, Vienna*.

“I am lost with admiration of these photographs of Mr. Muybridge.”—PROFESSOR MAREY, in *La Nature, Paris*.



47. COLUMBIAN EXPOSITION SPEEDWAY.

“Interesting and instructive to all.”—*New York Herald*.

“Highly interesting and valuable for every lover of horses.”—*Illustrirte Zeitung, Berlin*.

“We cannot more fittingly conclude our review than by repeating our recommendation of the work to all artistic and scientific bodies.”—*The Nation, New York*.

“So perfect was the synthesis that a dog in the lecture room barked and endeavored to chase the phantom horses as they galloped across the screen.”—*Berkeley Weekly News*.



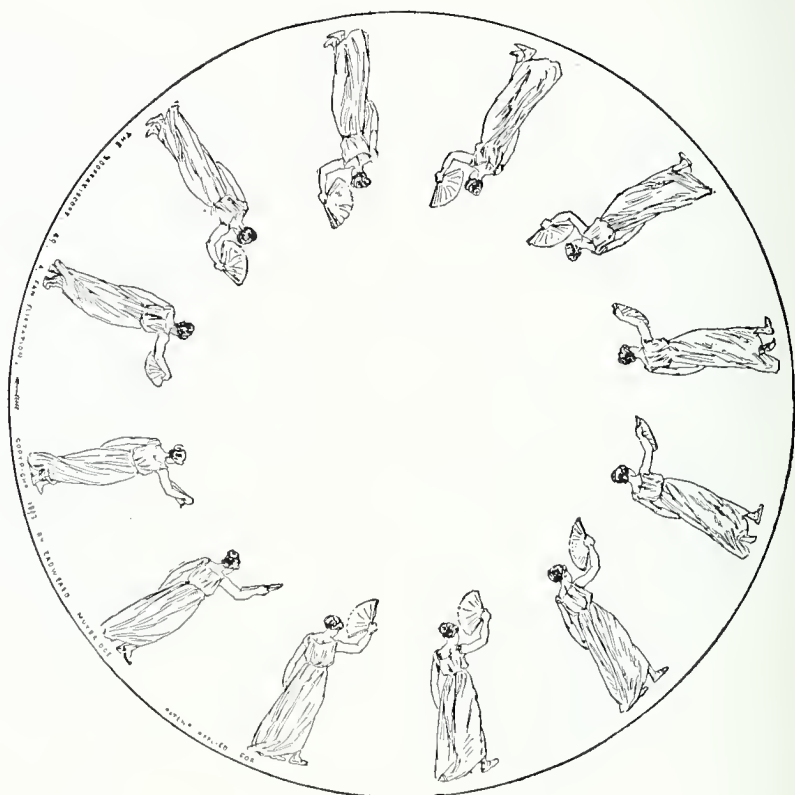
48. VILLAGE BLACKSMITHS.

“Noted artists, such as Menzel, Knaus, Begas; eminent scientists, such as von Helmholtz, Siemens and Förster and even the imperturbable field-marshal, Count von Moltke, were enthusiastic in their applause.”—*Illustrirte Zeitung*.

“A very large number could not obtain admission, so great was the desire to hear the lecture. . . . A wonderful surprise even to the careful observer of Nature.”—*Die Press*, Vienna.

“The lecture was received with stormy applause.”—*Berliner Post*, Berlin.

“The lecture was given in a popular manner, with



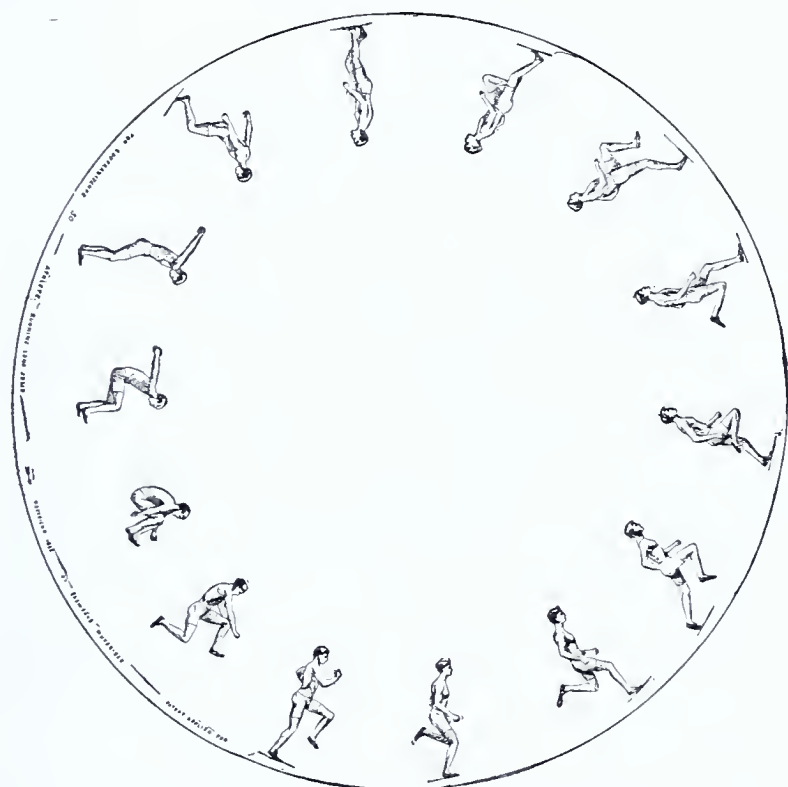
49. A FAN FLIRTATION.

scientific accuracy and artistic taste. . . . The room was filled to the last corner; nearly all the Royal Family and the Ministers were present.”—*Münchener Neueste Nachrichten*, Munich.

“After attending Mr. Muybridge’s demonstrations, we felt no surprise at his having been received so enthusiastically in Paris.”—*Berliner Tageblatt*, Berlin.

“The lectures of Mr. Muybridge are unquestionably the most intensely interesting we ever listened to. No one in Berlin should fail to attend them.”—*Norddeutsche Allgem. Zeitung*, Berlin.

“Some lectures are too technical for the general public.



50. ATHLETE, RUNNING LONG JUMP.

Here is one in which everybody is interested. The Lecture Theatre was crammed to repletion; we thought a few vacant places might have been reserved for those whose pleasant duty it is to record the brilliant success of Mr. Muybridge."—*Pall Mall Budget*, London.

"So great an interest did the demonstrations excite that Mr. Muybridge was unanimously requested to repeat them. Two days afterward this distinguished company, including the venerable Field-Marshal (Count von Moltke) himself, attended a repetition of the lecture."—*Illustrirte Zeitung*.

APPENDIX B.

ANIMAL LOCOMOTION.

DESCRIPTION OF THE PLATES.

The results of the investigation executed for the University of Pennsylvania are

SEVEN HUNDRED AND EIGHTY-ONE SHEETS OF ILLUSTRATIONS,

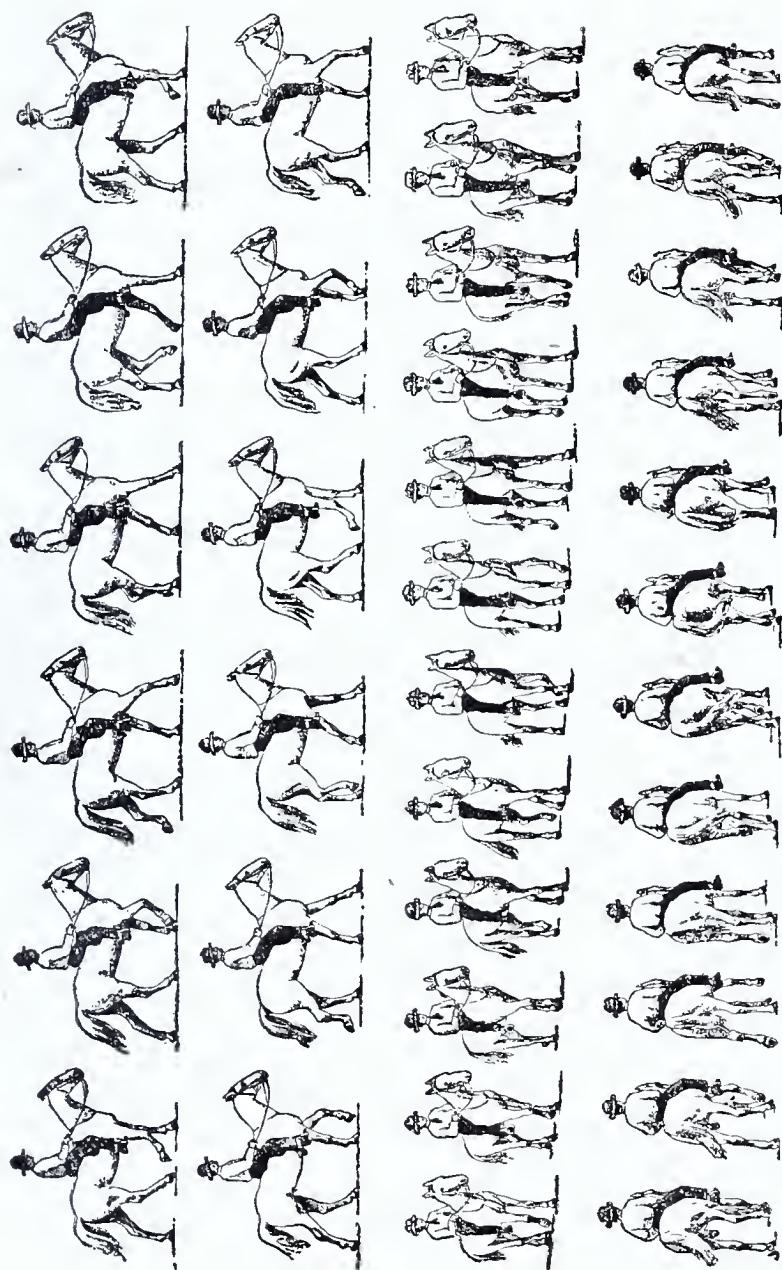
containing more than 20,000 figures of men, women, and children, animals and birds, actively engaged in walking, galloping, flying, working, jumping, fighting, dancing, playing at base-ball, cricket, and other athletic games, or other actions incidental to every-day life, which illustrate motion or the play of muscles.

These sheets of illustrations are conventionally called "plates."

EACH PLATE IS COMPLETE IN ITSELF WITHOUT REFERENCE TO ANY OTHER PLATE,

and illustrates the successive phases of a single action, photographed with automatic electro-photographic apparatus at regulated and accurately recorded intervals of time, *consecutively* from one point of view; or, *consecutively* AND *synchronously* from two, or from three points of view.

A series of twelve consecutive exposures, from each of the three points of view, are represented by an outline tracing on a small scale of plate 579, a complete stride of a horse walking; the intervals of exposures are recorded as being one hundred and twenty-six one-thousandths of a second.



REDUCED OUTLINE TRACING OF PLATE 579.—"ANIMAL LOCOMOTION."

When one of the series of foreshortenings is made at a right angle with the lateral series the arrangement of the phases is usually thus:

													Laterals.
1	2	3	4	5	6	7	8	9	10	11	12		
													Rear Foreshortenings from points of view on the same vertical line, at an angle of 90 deg. from the Laterals.
1	2	3	4	5	6	7	8	9	10	11	12		
													Front Foreshortenings from points of view on the same horizontal plane, at suitable an- gles from the Laterals.
1	2	3	4	5	6	7	8	9	10	11	12		

The plates are not *photographs* in the common acceptation of the word, but are printed in PERMANENT INK, from gelatinised copper-plates, by the New York Photo-Gravure Company, on thick linen plate-paper.

The size of the paper is 45×60 centimetres—(19×24 inches), and the printed surface varies from 15×45 to 20×30 centimetres—(6×18 to 9×12 inches).

The number of figures on each plate varies from 12 to 36.

To publish so great a number of plates as one undivided work was considered unnecessary, for each subject tells its own story; and inexpedient, for it would defeat the object which the University had in view, and limit its acquisition to wealthy individuals, large Libraries, or Institutions where it would be beyond the reach of many who might desire to study it.

It has, therefore, been decided to issue a series of One Hundred Plates, which number, for the purposes of publication, will be considered as a “copy” of the work. These one hundred plates will probably meet the requirements of the greater number of the subscribers.

In accordance with this view is re-issued the following prospectus.

PROSPECTUS

ANIMAL LOCOMOTION,

AN ELECTRO-PHOTOGRAPHIC INVESTIGATION OF CONSECUTIVE
PHASES OF ANIMAL MOVEMENTS,

BY

EADWEARD MUYBRIDGE.

Commenced, 1872—Completed, 1885.

PUBLISHED 1887, UNDER THE AUSPICES OF THE
UNIVERSITY OF PENNSYLVANIA.

Exclusively by Subscription.

CONSISTING OF A SERIES OF

ONE HUNDRED PLATES,

AT A SUBSCRIPTION PRICE OF

ONE HUNDRED DOLLARS

For the United States, or

TWENTY GUINEAS

For Great Britain;

Or the equivalent of Twenty Guineas in the gold currency
of other countries in Central or Western Europe.

The Plates are enclosed in a strong, canvas-lined, full
AMERICAN-RUSSIA LEATHER PORTFOLIO.

Additional Plates in any required number will be supplied to the subscriber at the same proportionate rate; these, however, must be ordered at the same time as the subscription Plates.

It was considered inadvisable to make an *arbitrary* selection of the one hundred Plates offered to subscribers, and with the object of meeting, as far as possible, their diverse requirements, they are invited to make their own selection, either from the subjoined list of subjects, or

from a detailed catalogue, which will be forwarded free of expense to every subscriber.

The following are the numbers of Plates published of each class of subjects, from which the subscriber's selection can be made:—

Class.	Plates Published.
1. Men, draped.....	6
2. “ pelvis cloth.....	72
3. “ nude.....	133
4. Women, draped.....	60
5. “ transparent drapery and semi nude.....	63
6. “ nude.....	180
7. Children, draped.....	1
8. “ nude.....	15
9. Movements of a man's hand.....	5
10. Abnormal movements, men and women, nude and semi-nude.....	27
11. Horses walking, trotting, galloping, jumping, &c.	95
12. Mules, oxen, dogs, cats, goats, and other do- mestic animals.....	40
13. Lions, elephants, buffaloes, camels, deer, and other wild animals.....	57
14. Pigeons, vultures, ostriches, eagles, cranes and other birds.....	27
Total number of Plates.....	781
Containing more than 20,000 Figures.	

Should the selection be made from the Catalogue, it will be advisable to give the Author permission to change any one of the selected Plates for any other illustrating the same action, if, in his judgment, the substituted Plate illustrates that action with a better model, or in a more perfect manner than the one selected.

With regard to the selection of Plates, however, it has been found by experience that unless any special subject or plate is required it will be more satisfactory to the subscriber if he gives the Author GENERAL IN-

STRUCTIONS as to the CLASS of subjects desired and to leave the SPECIFIC selection to him.

Many of the large Libraries and Art or Science Institutions in America and in Europe have subscribed for, and have now in their possession, a complete series of the seven hundred and eighty-one Plates, the subscription price for which is

FIVE HUNDRED DOLLARS

in the United States,

ONE HUNDRED GUINEAS

in Great Britain for the complete series, in eight full AMERICAN-RUSSIA LEATHER PORTFOLIOS, or if bound in eleven volumes, each plate *hinged*, full American-Russia leather,

FIVE HUNDRED AND FIFTY DOLLARS

in the United States,

ONE HUNDRED AND TEN GUINEAS

in Great Britain; or its equivalent for any city in Central or Western Europe.

Subscribers who wish to make use of these Plates for the promotion or diffusion of knowledge, or for artistic or scientific purposes, will be afforded facilities for acquiring working copies by special arrangement with the Author.

The investigations of the Author are so well known; and so generally recognized as affording the only basis of truthful interpretation or accurate criticism of Animal Movement, that it is perhaps scarcely necessary to quote from the many elaborate reviews of "Animal Locomotion," which have been published in the American, English, French, and German Scientific, Artistic, and other Journals. A few extracts therefrom are however given in Appendix A.

For the value of the present work to the general stu-

dent of Nature and the lover of Art, no less than to the Artist and the Archæologist, the Physiologist and the Anatomist, it is with much pride and gratitude that he refers to the annexed list of some of his subscribers.

SUBSCRIBERS.

The general or departmental Libraries of the following

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Andrews, St.	Genève	Leiden	Roma
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Bonn	Hallé	Napoli	Utrecht
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Edinburgh	Jena	Pisa	Zürich
Erlangen	Kiel		

IMPERIAL, NATIONAL, OR ROYAL ACADEMIES OF FINE ARTS.

Amsterdam	Budapest	Liège	Roma (<i>de</i>
Antwerpen	Dresden	London	<i>France</i>)
Berlin	Düsseldorf	Manchester	Sheffield
Bern	Firenze	Milano	Torino
Birmingham	Frankfurt	München	Venezia
Bologna	Genova	Napoli	Wien
Breslau	Gent	Paris	Zürich
Bruxelles	Leipzig	Praha	

Architectural Institute, München

Herkomer School of Art, Bushey

ART MUSEUMS.

Amsterdam	Berlin	Budapest
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ARCHÆOLOGICAL INSTITUTES AND MUSEUMS,

Dresden	Königsberg	Rostock	Würzburg
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Griefswald	Leipzig	Strassburg	Zürich
Heidelberg	Prag	Wien	

INDUSTRIAL ART AND SCIENCE MUSEUMS.

Berlin	Edinburgh	Paris	Wien
Dublin	Kensington		

INDUSTRIAL ART SCHOOLS.

Amsterdam	Budapest	Nürnberg	Zürich
Breslau	Frankfurt		

LIBRARIES.

The Royal Library, Windsor Castle.

Imperial Library, Berlin.

Birmingham, Free Public	London, British Museum
Edinburgh, Advocates'	Manchester, Free Public
Glasgow, Mitchell Free	Nottingham, Free Public
Liverpool, Free Public	Paris, National Library

ANATOMICAL INSTITUTES.

Bern	Innsbrück	München	Tübingen
Breslau	Kiel	Pisa	Würzburg
Freiburg	Königsberg	Prag	Zürich
Hallé	Leipzig	Rostock	

ROYAL COLLEGES OF SURGEONS.

Edinburgh	London
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PHYSIOLOGICAL INSTITUTES.

Basel	Freiburg	Kiel	Strassburg
Berlin	Genova	Königsberg	Torino
Bern	Göttingen	Leipzig	Tübingen
Bologna	Griefswald	Louvain	Wien
Bonn	Hallé	München	Würzburg
Breslau	Heidelberg	Napoli	Zürich
Bruxelles	Innsbrück	Prag	
Erlangen	Jena	Rostock	

VETERINARY INSTITUTES.

Alfort	Bern	Berlin	Dresden	London
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ANTHROPOLOGICAL MUSEUMS.

Dresden	Firenze
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ETHNOLOGICAL, NATURAL HISTORY, AND ZOÖLOGICAL
INSTITUTES AND MUSEUMS.

Amsterdam	Kiel	Liège	Paris
Bruxelles	Leiden	Napoli	Rostock
Freiburg			

PHYSICAL INSTITUTES.

Basel	Genève	Prag	Rostock
Bologna	Heidelberg	Roma	Utrecht
Bruxelles	Padova		

POLYTECHNIC HIGH SCHOOLS.

Berlin	Firenze	Wien	Zürich
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COLLEGES.

Charterhouse	Clifton	Dublin (Trin.)
Eton	Owens	Wellington

ROYAL PORCELAIN MANUFACTORIES.

Berlin	Dresden
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ARTISTIC, LITERARY OR SCIENTIFIC CLUBS.

Düsseldorf, <i>Malkestén</i>	London, <i>Athenæum</i>
Glasgow, <i>Western</i>	Rome, <i>Internazionale</i>

Agricultural High School of Berlin
 Faculty of Medicine of Paris
 Faculty of Physicians and Surgeons of Glasgow
 Psychological Institute of Leipzig
 Royal College of Physicians, Edinburgh
 Royal Institution, Edinburgh
 Royal Dublin Society
 Royal Society of London

DEPARTMENTS OF THE U. S. GOVERNMENT.

Bureau of Education	National Museum
Bureau of Engraving	Patent Office
Bureau of Ethnology	Smithsonian Institution
Department of War	Surgeon General's Office.
Library of Congress	

INSTITUTIONS OF ART AND OF ART TRAINING.

Baltimore, Maryland Institute.
Boston, Museum of Fine Arts.
Chicago, Art Institute.
Cincinnati, Art Museum.
Milwaukee, School of Design.
Minneapolis, School of Design.
New Bedford, Swain School.
New York, Cooper Union.
New York, Metropolitan Museum of Art.
New York, National Academy of Design.
Philadelphia, Academy of Fine Arts.
Philadelphia, School of Industrial Art.
Philadelphia, School of Design for Women.
St. Louis, Museum of Fine Arts.
Washington, Corcoran Gallery of Art.

INSTITUTIONS OF SCIENCE.

Academy of Natural Sciences, Philadelphia.
American Institute, New York.
American Philosophical Society, Philadelphia.
College of Physicians, Philadelphia.
Essex Institute, Salem.
Franklin Institute, Philadelphia.
Museum of Comparative Zoölogy, Cambridge.
Museum of Natural History, New York.
Peabody Museum of Yale College.

UNIVERSITIES AND COLLEGES.

Brown	Johns Hopkins	Nebraska	Vassar
Columbia	Kansas	New York	Vermont
Cornell	Lehigh	Pennsylvania	Wellesley
Harvard	Minnesota	Princeton	Yale

LIBRARIES.

Baltimore—Peabody	Minneapolis—Public
Boston—Athenæum	New Bedford—Public
Boston—Public	New York—Mercantile
Brooklyn—L. I. Historical	New York—State
Brooklyn Library	Pennsylvania—State
Chicago—Historical	Philadelphia Library
Chicago—Public	St. Paul—Public
Cincinnati—Public	San Francisco—Public
Denver—Mercantile	Springfield (Mass.)—Public
Harlem Library	Wisconsin—State Historical
Massachusetts—State	Worcester (Mass.)—Public

It is impossible within the limits of this appendix to record the names of the many well-known *Dilettanti*, Art Connoisseurs, Manufacturers, etc., who have acquired copies of *Animal Locomotion*, and it is difficult, without unjust discrimination, to select a few from among the many Eminent Men whose names and works are known all over the world and who are subscribers. Among those, however, who have honored the Author by placing their names on his subscription book—all academical and university distinctions being omitted—are the following :

ARCHITECTS, PAINTERS OR SCULPTORS.

Alma-Tadema	Faed	Marks	Roth
Armitage	Fildes	du Maurier	Rümann
Becker	Falguière	Meissonier	St. Gaudens
Begas	Fremiet	von Menzel	Schilling
Bonnat	Frith	Millais, Sir J. E.	Siemering

Boughton	Garnier	Morot	Story
Bouguereau	Gérôme	Munkacsy	Thornycroft
Bridgman	Gilbert	Orchardson	Tiffany
Burnham	Gordigiani	Oules	Vibert
Carolus—	Gow	Parsons	Vinea
Duran	Herkomer	Passini	Villefroy
Cavelier	Hunt, Holman	Poynter	Wagner
Conti, Tito	von Kaulbach	Puvis, de Ch	Watts
Dalou	Knaus	Richardson	Ward,
von Defregger	Knight	Richmond	Wells
Detaille	Kopf	Rivière-Briton	Weeks
Dubois	Leighton, Sir F.	Robert-Fleury	von Werner
Eisenmenger	von Lenbach	Rodin	Whistler
Ende	von Löffitz	Roll	Zügel.

ARCHÆOLOGISTS, AUTHORS OF ART WORKS, ETC.

von Berlepsch	von Kekule	Pulszky
Bullen	Klein	Ruskin
von Duhn	Muntz	diSambuy, Conte
Ewald	Overbeek	Smith, Gen. Sir R. M.
Falke	Pietsch	Treu
Furness, H. H.	Preuner	Wolff, Albert.

ANATOMISTS, ANTHROPOLOGISTS, BIOLOGISTS, ETHNOLO-

GISTS, PALEONTOLOGISTS, PATHOLOGISTS, PHYSIOL-

OGISTS, PSYCHOLOGISTS, ZOOLOGISTS, ETC.

Acland, Sir H. W.	Haughton	Mosso
Agassiz, A.	Heidenhain	Müller, Max
Barrier	Hering	Munk
du Bois-Reymond	Humphry	Owen, Sir R.
Bowditch	Huxley	Pasteur
Bowman, Sir W.	Jensink	Pepper W.
Braune, W.	von Kölliker	Pettigrew
Brown-Sequard	von Kries	Powell
Burdon-Sanderson	Lankester	Rabl

Cleland	Leidy	Romanes
Darwin, F.	Lubbock, Sir J.	Rückert
Exner, S.	Ludwig	Schiff
Fick	Mantegazza	Schütz
Flower	Marey	Virehow, R.
Foster	Marshall	von Voit
Galton, F.	Meyer	Wear-Mitchell
Gill	Milne-Edwards	Wood
Goode, Brown	Mivart,	Wundt
Hasse	Moleschott	von Zittell.

PHYSICISTS, ETC.

Abney	Edison	Matthiessen
Blake	Glaisher	Quinke
Blazerna	von Helmholtz	Spottiswoode
Bramwell, Sir F.	Huggins	Thomson, Sir W.
Bunsen	Langley	Vogel
Ditscheiner	Mach	Weber.

MILITARY SCIENTISTS.

Field Marshal Count von Moltke
 General U. S. Grant
 General W. T. Sherman
 General P. H. Sheridan
 General R. B. Hayes.

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